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Human resource oriented antecedents to post-adoption technology performance

Susan K. Lippert
Drexel University, lippert@drexel.edu

P.M. Swiercz
prof1@gwu.edu

HUMAN RESOURCE ORIENTED ANTECEDENTS TO POST-ADOPTION TECHNOLOGY PERFORMANCE

Lippert, S.K., Drexel University, 101 N 33rd Street, Room 331, Philadelphia, PA, 19104, USA, lippert@drexel.edu
Swiercz, P.M., The George Washington University, Funger Hall, Suite 315B, Washington, DC, 20052, USA, prof1@gwu.edu

Abstract

This study investigated the influence of human resource oriented antecedents to user perceptions toward the performance capabilities of a new logistics information tracking technology. Willingness to take risks, job relevance, trialability and technology trust were evaluated as antecedents to technology performance. The research examined the effect of these constructs on technology acceptance as a function of post-adoption perceptions of technology performance. A research model was developed and tested based in Rogers' (2003) Innovation Diffusion Theory. Data from a mail survey were collected from 224 first-tier supply chain users of the technology. Structural equation modelling was used to test six hypothesized relationships for significance, direction, and intensity. The findings indicate that: (a) willingness to take risks and job relevance affect technology trust and technology performance; and, (b) trialability affects perceptions of technology performance. The results of this study advance our understanding of post-adoption perceptions of supply chain affiliates and offer suggestions for enhancing user perceptions of technology performance. Implications from this study along with suggestions for future research are provided.

Keywords: Technology Performance, Technology Trust, Trialability, Job Relevance, Willingness to Take Risks, Innovation Diffusion Theory

1 INTRODUCTION

Because individual decision-making is critically important to the success of new information technology (IT) investments, researchers have long studied how and why individuals adopt new technologies. Within this broad area of inquiry, there have been several streams of research including the investigation of user behavioural intentions (e.g., Chan and Lu 2004) and more recently post-adoption behaviours (e.g., Ahuja and Thatcher 2005, Lippert and Forman 2005) of individual users. Arguably the most significant of these, to date, has been the stream of research focusing on individual acceptance of technology by using intention to use as the dependent variable (e.g., Davis 1989). For example, in a review and empirical assessment of nine competing models, Venkatesh et al. (2003) showcased both the range of different approaches to this common question and the utility of these different approaches for explaining individual acceptance outcomes.

In contrast, other streams of research have focused on the post-acceptance phase (e.g., Ahuja and Thatcher 2005, Karahanna et al. 1999, Lippert and Forman 2005, Parthasarathy and Bhattacherjee 1998). For technologies to improve productivity, they must be accepted and following acceptance, they must be used effectively and continually by employees in organizations. In other words, acceptance alone is an insufficient indicator of success because interaction between the individual and the technology is a dynamic process rather than a static event. In this regard, it is similar to the decision to invite a new roommate to join the household. At the time of the invitation, all of the parties have accepted each other as housemates. However, the experience of actually living together produces new knowledge about the longer term performance potential of the arrangement.

In a similar vein, individuals that have accepted a new technology continue to make on-going judgments regarding the performance of the system. These post-acceptance performance judgments affect their relationship with the technology and therefore have consequences for both the organization and the individual. From a human resources (HR) perspective, understanding what influences users' acceptance of new initiatives can affect overall organizational productivity and performance.

Research has demonstrated that in order for physical capital investments, e.g. new information technologies, to pay off, attention must be paid to their coupling with complimentary investments in human capital (Cherns 1976, Coakes et al. 2000, Eason 1988). Selecting the right technologies to meet the challenges is the responsibility of IT leaders; selecting the right human resources to use and support these technologies is the responsibility of HR leaders. Ensuring a best fit between the technology and the people who use these systems is a joint responsibility of both.

Understanding what influences user acceptance of a new technology is often described as one of the most mature research areas in the contemporary information systems (IS) literature (e.g., Hu et al. 1999, Venkatesh et al. 2003). In contrast, study of the relationship between technology and individuals' post-acceptance is limited (Ahuja and Bennett 2005, Lippert and Forman 2005). Studies have either used or advocated the inclusion of various indictors to evaluate implementation success including system use (DeLone and McLean 2003, Nah et al. 2004), user satisfaction (Forman and Lippert 2005), net benefits (DeLone and McLean 2003, Forman and Lippert 2005), and technology performance (Forman and Lippert 2005, Pagell et al. 2000). In this research, we focus on the path to post-adoption perceptions through the investigation of technology performance defined as an individual's assessment of the technology's performance across multiple logistics functions.

Supply chain technologies are often complex due to the diversity of functionality included in the systems. In particular, supply chain technologies require users to understand supply chain operations along with the mechanics to effectively use the technologies. Operational capabilities can include inputting part-level data for operational inventory, managing workload planning, evaluating order status to ensure on-time delivery, and verifying the accuracy of the order processing mechanism. Understanding and effectively using supply chain technologies are compounded by the need to understand operational capabilities. The technologies studied in many of the model development and comparison studies to date have been relatively simple, individual-oriented information technologies, as opposed to more complex and sophisticated organizational technologies that are the focus of managerial concern and of this study.

2 LITERATURE REVIEW AND RESEARCH APPLICATION

2.1 Innovation Diffusion Theory (IDT)

Since post-adoption perceptions and behaviour are largely an unexplored area in IS research, we use information technology adoption research as the starting point for our analysis. We employ theoretical insights from this theory to explore the nature and causation of post-adoption perceptions. Innovation diffusion theory (Rogers 2003) has a rich history in the information systems research domain (e.g., Gopalakrishnan and Damanpour 2000, Parthasarathy and Bhattacherjee 1998) as a theoretical foundation for examining technology adoption. This theory has been especially helpful in understanding the process by which an innovation is introduced to members of a social system over time.

According to the theory as formulated by Rogers (2003), the diffusion process of an innovation is comprised of four components: (1) the innovation; (2) the communication process; (3) time; and, (4) social system membership. The theory holds that organizations are comprised of interconnected subsystems and that adoption occurs at the subsystem level. Social systems within which innovations are introduced may consist of individuals, groups, organizations, or subsystems whose members share a common goal or objective connecting them together as a social system. As such, in the context of this research, the target social system consists of all members within a specific supply chain. Thus, consistent with Rogers (2003), treating organizations as subsystems in the context of supply chains is useful for examining post-adoption perceptions.

According to IDT, each member of a social system makes a personal adoption decision. Individuals develop perceptions and assessments of an innovation through a combination of personal assessments, the subjective evaluations of proximate peers who previously adopted the innovation, and through formal and informal training. The theory asserts that experiences of earlier adopters are communicated through interpersonal networks of peers. In effect, peers serve as models and the behaviours they model tend to be emulated by others within their social system.

2.2 Post-Adoption Technology Performance

While the initial adoption decision is very important, in the case of information technology, it is also important to acknowledge two very different scenarios under which initial adoption decisions occur. In the first scenario, the initial adoption decision occurs when one individual makes the decision to use the innovation. For example, an independent user might make an adoption decision between competing operating systems like UNIX, Windows, or Linux choosing to adopt one and reject the others. This type of adoption might be thought of as "embracement adoption" since one innovation is embraced while the others are discarded.

In the second scenario, the actual technology user(s) might have little or no voice in the adoption decision. In this circumstance, someone at an executive level makes the adoption decision and the user must adopt the new technology as a condition of continued employment. This type of adoption might be thought of as compliance or "mandated adoption". These two radically different circumstances allow for a range of post-adoption outcomes by the actual user that include: discontinuation, static adoption, and continuous adoption behaviours.

Static adoption occurs when the user accepts the system but declines to engage with the IT in any meaningful way. Given the Moore's Law pace of change that characterizes virtually all deployed technologies, static adoption is in many ways a slow paced version of discontinuation. In contrast, continuous adoption is characterized by a pattern of reciprocal change and adaptation. In this instance, the user engages the IT in a manner similar to the process of continuous improvement as pioneered by the Japanese and institutionalized in the philosophy of Total Quality Management. Every time the user takes an action to improve the process, observe the results, and thereby learn how to improve the process further over time, both the user and the target IT are in a state of continuous adoption.

Post-adoption technology performance is therefore highly dependent upon how the post-adoption user chooses to engage with the IT in the time period following the adoption decision. In a very practical sense, post-adoption technology performance represents the user's perceptions of how well a technology assists in performing job-related tasks (Forman and Lippert 2005). And it is at this interface, that one can observe the interaction between the technology system and the human resource system of the organization. The organisation is concerned with overall performance and the individual is concerned with personal job performance. A technology that fails to aid an individual in performing job-related tasks, as measured by the organisation's performance appraisal system, is a fast acting signal that job security is at risk. Individual workers, like the proverbial canary in the coal mine, are the first to detect and respond to a failing technology.

Technology performance has been used as a dependent measure in previous research (e.g., Pagell et al. 2000) to understand the effects of operational skills on technology performance within a manufacturing context. Technology performance refers to the technology's performance across multiple logistics functions. In the present research, technology performance along an automotive supply chain is indicated by users' perceptions of how well the supply chain management software enhances the job performance of individual users. More specifically, technology performance assesses the technology itself rather than evaluating a user's ability to successfully work with a given system. Understanding how well the technology performs provides a lens into the actual outcomes associated with internalizing a new innovation. This understanding is important because it better positions management to develop specific strategies aimed at influencing the antecedents of overall technology performance.

3 RESEARCH MODEL AND HYPOTHESES

Figure 1 summarizes the proposed model incorporating the hypothesized relationships for the antecedents of technology performance. The model suggests that the individual job performance related constructs of trialability, willingness to take risks, job relevance, and technology trust have an effect on technology performance.

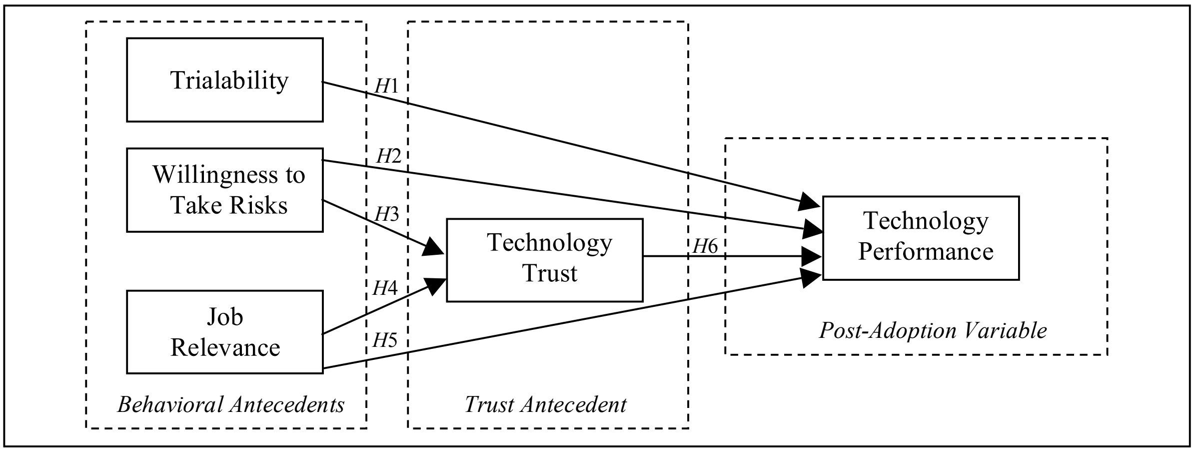

Figure 1. Research Model

3.1 Individual Behaviour Constructs

3.1.1 *Trialability*

Trialability represents the extent to which users would like an opportunity to experiment with the innovation prior to committing to its use (Agarwal and Prasad 1997). Rogers (2003) suggests that trialability is the degree to which an innovation may be experimented with on a limited basis. Researchers (Agarwal and Prasad 1997) found that individuals, who experiment with a new IT prior to accepting it, are more likely to adopt the new system. Additionally, Brown et al. (2003) found that individuals who experimented with cell phone banking prior to adopting were more likely to adopt it. According to Rogers (2003), an individual experiences less uncertainty when provided with an opportunity to try out the innovation, since this represents the opportunity to learn by doing. The perceived attributes of innovations, according to Rogers (2003), help to explain the different rates at which individuals adopt technologies. Innovations that are perceived as having greater trialability will be accepted at a faster rate than those that do not possess this characteristic. Trialability is a risk reduction strategy that enables an individual to experiment with a new innovation without absorbing too much inherent risk. The risk can be organizational, monetary, or to the individual's reputation, but it is distinguished by the perceived manageability of any negative outcomes that might arise from the adoption decision. Research suggests that innovations that can be experimented with on a small scale prior to full implementation are more likely to be adopted (Lippert and Forman 2005). Therefore,

> H1: The degree to which an individual is able to experience trialability with the new technology will positively affect perceptions of technology performance.

3.1.2 Willingness to Take Risks

Part of the process of accepting new innovations involves dealing with the uncertainty associated with using the new system. Uncertainty implies a lack of predictability of structure and information pertaining to the innovation (Rogers 2003). When new technologies are introduced into organizations, the change associated with shifting from the known to the unknown produces a sense of uncertainty for the organizational members. This uncertainty means that individuals experience a perceived risk associated with using the new technology in their work activities. Since part of the adoption process includes a phase where the new capabilities of the system are not yet known to the organizational member, an individual's willingness to take risks and hence assume this uncertainty may be an important determinant in facilitating continued technology usage. Willingness to take risks is an individual's willingness to engage in activities which may lead to loss or unintended negative consequences (Deutsch 1958). According to Rogers (2003), consequences are the changes that occur to an individual as a result of the introduction of a new technology. These consequences can be desirable or undesirable, direct or indirect, anticipated or unanticipated. An individual who is willing to take risks is more likely to effectively handle the effects of undesirable consequences (Rogers 2003) and embrace the positive outcomes that might also arise from new technology adoption. Risk takers are therefore more likely to express greater trust in the new technology. Therefore,

H2: The degree to which an individual is willing to take risks will positively affect his/her trust in the technology.

Technology performance represents an individual's assessment of the technology's performance across multiple logistics functions. When desirable consequences are perceived early as a result of the IT introduction, the individual is more likely to be able to identify additional embedded, but not yet realised, performance capabilities of the new system. As such, an individual who is willing to assume the risk of uncertainty, will probably be able to identify the technology performance capabilities to a greater degree than an individual who is not willing to take risks. According to Kramer (1999), trust entails a state of perceived vulnerability or risk. The state of perceived vulnerability is derived from uncertainty associated with actions of other entities upon which an individual depends (Kramer 1999). This assumption of perceived vulnerability is a central tenet when defining trust (Mayer et al. 1995, Deutsch 1958). In order for a trust relationship to exist, individuals must be potentially vulnerable since without a state of vulnerability, there is no opportunity for trust (Harvey 1999). Therefore,

H3: The degree to which an individual is willing to take risks will positively affect his perceptions of technology performance.

3.1.3 Job Relevance

Job relevance is the degree to which an IT is applicable to an individual's job (Venkatesh and Davis 2000). As individuals have opportunities to work with new technologies, they develop an awareness of the technological capabilities available to them within the system. Each interaction with the system provides the user with data about how well the IT will function toward the completion of daily job requirements. Trust assessments are often based upon a single incident or incrementally as individuals experience the IT each time the system is used (Denning 1993). Each time the new IT is operational when needed, a positive assessment of performance is noted. Past experiences, both positive and negative, influence an individual's ongoing assessment of that system.

To the user, system predictability is of motivational relevance when an individual is dependent upon the technology to function consistently for task completion. The potential for negative consequences is likely to arise if the individual is unable to complete the necessary tasks due to an inconsistently functioning system. The result of this motivationally relevant event is unfulfilled trust in the technology. Therefore, according to Deutsch (1958), if an individual expects an event to occur (the technology to function consistently) and the event has motivational relevance (the need to complete tasks), then, the individual experiences trust in the target object (the technology). Therefore,

H4: The degree to which an individual perceives that a new technology has job relevance, the more likely he is to trust the technology.

As an individual gains experience working with the new system, a deeper understanding of the technology's functional capabilities emerges. The discovered capabilities are often context-specific to the application being used. If the individual sees job relevance in the functionality of the new system, he is more likely to understand the basis of the technology and how it operates. Therefore,

H5: The degree to which an individual perceives that a new technology has job relevance, the more likely he is to express positive perceptions of technology performance.

3.2 Technology Trust Construct

In the present research, technology performance represents the user's perceptions of how well the supply chain management software assists in performing tasks. More specifically, in this research, performance is represented by the automotive supply chain member's evaluation of the technology's operational capabilities associated with specific logistic functions. The technology performance construct is intended to capture the user's perceptions of how well the technology functions with respect to specific logistics operations. Since technology trust represents the extent to which an individual is willing to place trust in the information technology, an individual's experiences with the system are likely to influence his perceptions of the technology. Therefore,

H6: The degree to which an individual experiences trust in the technology will positively affect his perceptions of technology performance.

4 METHODOLOGY

4.1 Survey Instrument Development

Likert-scale items with seven-point anchors were used to measure all hypothesized relationships in the current study. Response options ranged from strongly disagree (1) to strongly agree (7) with interval created data from an ordinal response pattern. Table 1 provides a summary description of each scale along with the reported reliabilities. Minor changes in the scales items were made in the final version of the instrument to better align them with the target technology.

Construct	Construct Definition	Alpha (Items)	Scale Sources
Trialability	The degree to which a user can have an experiential test or trial of the innovation	.71 (2) .92 (3)	Moore and Benbasat 1991 Karahanna et al. 1999
Willingness to Take Risk	The willingness of an individual to engage in activities which may lead to loss or unintended negative consequences	.78 (3) .85 (5)	Donthu and Gilliland 1996 Jaworski and Kohli 1993
Job Relevance	The degree to which a technology is applicable to an individual's job	.90 (2)	Venkatesh and Davis 2000
Technology Trust	The extent to which an individual is willing to place trust in the information technology	.95 (4)	Lippert 2005
Technology Performance	The technology's (CVN) performance across multiple logistics functions	.83 (6)	Dahlstrom et al. 1996

Table 1. Research Constructs

4.2 Administration Protocols

In advance of the data collection mailing, the CIO of a fourth-party logistics (4PL) firm sent a letter to the total population of first-tier supply chain members of the second largest U.S. automotive supply chain indicating that a survey was forthcoming. In a separate mailing, participants received the survey, a postage-paid return envelope, and the researchers' cover letter explaining the study's purpose. Both letters promised confidentiality and indicated that the study was being conducted by academic researchers. Each survey was addressed to specific Collaborative Visibility Network (CVN) users based on a contact list developed, maintained, and verified by the 4PL. The list included all individuals authorized to use the system along with their contact information. Respondents also received a reminder on the CVN login page and a follow-up email as a reminder.

4.3 Technology under Investigation

As indicated, the technology examined in this study is Collaborative Visibility Network (CVN), an Internet-based technology designed to facilitate a range of logistics functions allowing shippers to schedule or confirm shipments to one of the automotive company's distribution centres in the U.S. CVN was designed to benefit the supply chain through: (1) providing real-time visibility of logistics information; (2) optimizing the modification of manufacturing schedules due to supply changes; (3) maximizing improved inventory control; (4) reducing inventory carrying costs; (5) increasing customer satisfaction through improved order fulfilment; and (6) reducing out-of-stock scenarios through precision control.

5 DATA ANALYSIS

5.1 Characteristics of Sample

In total, 3,000 surveys were distributed via an original contact list obtained from the 4PL. A census was conduced to ensure that all qualified members of the population (authorized CVN users) received a survey. Unfortunately, the contact list was discovered to be compromised by numerous address errors resulting in the return of 562 surveys because of incorrect addresses. After removing incomplete surveys from the 341 returned questionnaires, 224 usable surveys were included in this study. Non-response bias was evaluated by comparing the demographic characteristics of the first 75 respondents with the last 75 respondents. No discernable differences between the characteristics of these two groups were revealed.

An analysis of the respondent demographic characteristics shows them to be predominantly female, middle-aged, with modest education credentials. More specifically, 62.9% were female, 37.1% were male. The gender distribution found in this study is similar to the entire population from which this sample was drawn. Specifically, the original distribution by gender within the population of study was 57.2% women and 42.8% men. Participants varied in age: (12.6%, 20-29 years of age; 32.3%, 30-39; 36.8%, 40-49; 17.0%, 50-59; and 1.3% over 60). Education of the participants also varied: (high school diplomas, 20.5%; some college, 44.2%; college degree, 32.6%; other, 2.7%). No participants indicated the completion of graduate coursework or a graduate degree. Twenty respondents were from Canada and 204 were from the United States. Of the 204 from the United States, 53 were from rural locations and 151 were from urban locations.

5.2 Analysis of Construct Validity and Reliability

Measurement reliability was assessed through the use of Cronbach's (1951) alpha and tests for construct validity. Table 2 depicts the means, standard deviations, alphas and inter- correlations of the variables. The coefficient alphas for each construct were above the acceptable threshold of 0.70 Nunnally (1978) and are therefore considered strong measures with alphas ranging between 0.78 and 0.96. One item, WTR6, was dropped from the willingness to take risks construct due to cross-loading.

Means, Standard Deviations, Correlations and Measures of Reliability Among the Variables (N = 224)

	Mean	S.D.	1	2	3	4	5
1. Trialability	2.53	1.80	(.96)				
2. Willingness to Take Risks	5.37	1.05	.07	(.85)			
3. Job Relevance	4.61	1.52	.13**	.21*	(.78)		
4. Technology Trust	4.98	1.59	.16**	.22*	.50*	(.95)	
5. Technology Performance	4.01	1.58	.36*	.14**	.33*	.53*	(.82)

* Correlations are significant at the 0.01 level ** Correlations are significant at the 0.05 level.

Table 2. Means, Standard Deviations, Correlations, and Reliabilities

A factor analysis was conducted to determine if the constructs were distinct and unique. A principal components factor analysis with a varimax rotation was performed on the twenty-one item scale as viewed by the respondents to confirm the separate constructs of trialability (TR), willingness to take risks (WTR), job relevance (JR), technology trust (TT), and technology performance (TPF). Table 3 shows that there is minimal cross-loading and that each item loads on a unique factor. Additionally, 76.39% of the variance is explained. As such, construct validity is supported.

	Factor 1 Technology Trust	Factor 2 Willingness to Take Risks	Factor 3 Trialability	Factor 4 Technology Performance	Factor 5 Job Relevance
TT1	**0.826**	0.216	0.116	-0.051	0.207
TT2	**0.856**	0.338	0.120	0.083	0.084
TT3	**0.879**	0.276	0.115	0.072	0.185
TT4	**0.874**	0.315	0.088	0.077	0.154
TPF1	0.252	**0.824**	0.019	0.089	0.101
TPF2	0.015	**0.719**	0.004	0.291	0.068
TPF3	0.282	**0.826**	0.079	0.160	0.000
TPF4	0.356	**0.768**	0.018	0.052	0.169
TPF5	0.305	**0.799**	0.012	0.042	0.168
TPF6	0.264	**0.787**	0.058	0.099	0.077
WTR1	0.134	0.056	**0.715**	-0.097	0.132
WTR2	0.035	-0.014	**0.796**	-0.042	0.088
WTR3	0.060	0.044	**0.818**	0.177	-0.017
WTR4	0.086	0.022	**0.842**	0.111	0.060
WTR5	0.035	0.039	**0.770**	-0.015	-0.019
TR1	0.023	0.135	0.010	**0.938**	0.057
TR2	0.067	0.168	0.028	**0.942**	0.009
TR3	0.063	0.183	0.064	**0.949**	0.032
JR1	0.300	0.299	0.152	0.020	**0.782**
JR2	0.219	0.073	0.081	0.072	**0.887**
% of variance explained	36.08%	15.14%	13.48%	6.47%	5.21%

Table 3. Factor Analysis of Study Constructs

5.3 Analysis of Convergent and Discriminant Validity

To further confirm the independence of the separate constructs a test for convergent and discriminant validity, the multitrait-multimethod (MTMM) analysis (Campbell and Fiske 1959) was employed. Convergent validity assesses the inter-item correlations of measures in order to gauge concept similarity (Hair et al. 1999). It was assessed and the inter-item correlations were found to highly correlated for each of the separate scales, yielding significance beyond the $p < 0.001$ level. Consistent with Doll and Torkzadeh (1990), the smallest within-variable correlations are: TR = 0.86; WTR = 0.41; JR = 0.64; TT = 0.76; and TPF = 0.48. Based on these results, the scales demonstrate the anticipated high correlations among the items. Convergent validity is supported.

Discriminant validity assesses the degree to which two theoretically similar constructs are distinct (Hair et al. 1998). With discriminant validity, the total scale correlation between conceptually distinct measures should be low. The three protocols, outlined by Campbell and Fiske (1959) for establishing discriminant validity, were followed. The first discriminant validity criterion was to ascertain the level of general method variance contained within the matrix (Elbert 1979). As suggested by Campbell and Fiske (1959), values within the validity diagonal should be higher than the values contained within the heterotrait-heteromethod triangles. In this study, the first criterion was satisfied in 90.2% of the cases, indicating that the first test of discriminant validity criterion has been met.

The second discriminant validity criterion was to ascertain if the validity diagonal coefficients are greater than the heterotrait-monomethod coefficients (Campbell and Fiske 1959). The second criterion was satisfied in 95.2% of the cases, a strong indication that method variance was not an issue. The third discriminant validity criterion used was to ascertain if the same pattern of trait inter-relationships is found in both the heterotrait-heteromethod coefficients and the heterotrait-monomethod coefficients. Kendall's Coefficient of Concordance W was used to determine the magnitude of agreement among all the coefficients in the MTMM. Kendall's W was found to be 0.298 at $p < 0.0001$ which suggests that there is similarity in the coefficient patterns. Hence, criterion three was also met. Given the results of the three criteria assessments, discriminant validity is demonstrated.

5.4 Hypothesized Model Results

The research model was tested with an item-level structural equation model. Fit indices indicated that the model fit the data well, $\chi^2_{.321}$ (N = 224) = 1, NNFI = 1.018, IFI = 1.002, CFI = 1.000, RMSEA = 0.00, SRMR = 0.007. All SEM analyses were performed with covariance metrics (Cudeck 1989). In addition to the statistical evaluation of fit using chi-square, CFI, NNFI and IFI over 0.90 are considered as criteria of good fit (Kelloway 1998). These indices improve the fit of the hypothesized model over the null model, in which all observed variables are specified as uncorrelated. These thresholds have been found to be sufficient criteria even in small sample situations Bentler (1990). Browne and Cudeck (1993) suggest that an RMSEA of 0.05 or less indicates a close fit. The SRMRs less than 0.05 indicate a good fit to the data (Diamantopoulos and Siguaw 2000).

In their seminal article, Rosnow and Rosenthal (1989) assert that p-values in excess of 0.05 contain valuable information and are worthy of reporting from an ontological perspective since there is distinct threshold between significant and non-significant results. Following the logic of Rosnow and Rosenthal (1989), we report findings for $p < 0.10$.

Table 5 summarizes this study's findings. This study found that trialability influences an individual's perceptions of technology performance. Willingness to take risks affects perceptions of technology trust and technology performance suggesting that the uncertainty associated with risk taking can have positive influences in the continued use of technology. Job relevance was found to influence technology trust and technology performance. Technology trust affects technology performance. In general, the results suggest that the behavioural constructs of trialability, willingness to take risks, and job relevance impact technology trust and perceptions of technology performance.

Paths	**Coefficient**	**t-value**	**Hypothesis**	**Supported**
Trialability → technology performance	.30	4.705*	H1	Yes
Willingness to take risks → technology trust	.05	0.789*	H2	Yes
Willingness to take risks → technology performance	-.03	-0.410*	H3	Yes
Job relevance → technology trust	.56	7.808*	H4	Yes
Job relevance → technology performance	.06	0.726*	H5	Yes
Technology trust → technology performance	.52	6.325*	H6	Yes
* Parameter estimates are significant at 0.10 or less				

Table 5. Path Coefficients and t-Values for Hypotheses Tested

6 DISCUSSION

This study found that human resource oriented antecedents – that is, variables linking IT adoption to individual perceptions of personal job performance – influence user perceptions toward the performance capabilities of a new logistics information tracking technology. Trialability, willingness to take risks, job relevance, and technology trust were found to influence an individual's post-adoption perceptions of technology performance.

From a managerial perspective, these findings suggest that management should be attentive to the inter-relationship between HR systems design and technology adoption success, particularly in situations where users were not fully involved in the initial adoption decision and when continuous adaptation is required to fully access the performance potential of the technology. For example, the demonstrated impact of triability on post-adoption perceptions of technology performance indicates that performance appraisal and reward systems need to be designed to accommodate experimentation with the new technology. Clearly, when an individual is testing a new IT, he may not be producing billable products or output. As a result, the individual level performance consequences of trialability are time away from productivity and less than optimal output. This is particularly important in a supply chain context when other members of the supply chain depend upon accurate and timely individual performance throughout the entire system.

In addition, the study found that willingness to take risks impacts not only an individual's level of technology trust but also perceptions of technology performance. In supply chains, willingness to take risks remains a tempered behaviour because of the high inter-dependencies between supply chain partners. Willingness to take risks is not only an individual variable as suggested by previous investigations of IT adoption, it is also a contextual variable in that the organization, by virtue of its chosen HR system design, sets boundaries on tolerated risk-taking behaviour.

Managers need to recognize that the individual may be willing to take risks when using the new system but in the absence of an HR system supporting this behaviour; it is unlikely to be expressed in support of successful technology acceptance. As such, from an HR perspective, this finding suggests that management can encourage employees' willingness to take risks by supporting behaviours that enable individuals to learn about and experience the new system both in the initial adoption phase and as part of continuous experience as the interface between the employee and the technology matures. As the individual works with the IT through risk-taking behaviour, perceptions that the technology can be trusted are also likely to increase, even in situations where use is mandated.

The degree to which a technology is applicable to an individual's job, i.e., job relevance, was found to influence an individual's trust in the technology and perceptions of technology performance. Since job relevance is central to the application of the technology for completion of daily tasks, it is important from the HR perspective to implement job design, performance appraisal systems and training systems to ensure that the use of the new technology matches an employee's changed and changing job responsibilities. Technologies, particularly like the major supply chain initiative profiled in this research, are highly complex and nuanced. Even if a technology performs as expected in its initial adoption phase, the scale and scope of this type of technology investment requires a dynamic and responsive job approach toward the job design.

The degree to which an individual trusts a technology was found to influence perceptions of technology performance. This, in a manner consistent with previous research on the importance of technology trust (Lippert 2005), suggests that providing opportunities for individuals to experience positive outcomes, both in terms of the technology itself and in improved job performance, can serve as enablers to increased trust in the system. Likewise, when individuals are able to recognize the functional abilities of the new technology, performance capabilities embedded in, but not fully realized, may be more easily identified.

7 IMPLICATIONS

Persuading users to adopt new technologies remains a systems implementation challenge (Agarwal and Prasad 1999) of vital importance. This research revealed that it is advisable for organizations to evaluate their new innovations through an HR lens to ensure that the organization has prepared its employees to effectively use and continuously adapt in partnership with the new technology. Organizations should acknowledge that the inclusion of HR initiatives as part of the technology adoption process can be a powerful tool for encouraging individuals to respond favourably and interactively to the new innovation. If the HR component of the organization supports the adoption process an individual is demonstrably more likely to embrace the new system. More specifically, if the new IT system impacts the individual's performance appraisal, acceptance of the technology will be influenced. If the new technology has a high learning curve or does not meet objectives important to each employee, the individual will exhibit adverse behaviours toward the system. In effect, when career costs get too high, individuals will become intolerant of the new technology. Conversely, when the HR systems signals the career prospects are enhanced by adopting and engaging with the new technology, continues development and growth are predictable outcomes.

Managers should work with HR professionals to identify potential human system design barriers to the acceptance of technology. These obstacles might be related to individual response factors or organizational policy and practices barriers. The identification of individual responses such as personal perceptions of how the IT will function related to risk, job relevance, trialability, and technology trust are associated with individual decision-making. HR policy barriers in the form of organizational policies can also influence implementation success. These two factors interact in that they can have a multiplicative effect.

This research suggests that two different domains exist that can influence individual and organizational response to post-adoption behaviour – the individual domain and the HR system domain. The individual domain, by far more investigated of the two, is important but also highly disaggregated. In other words, success in this domain is highly dependent on the personal and often times idiosyncratic responses of employees. The HR system domain, in contrast, is context focused. The managerial goal with respect to the HR domain is the creation of polices and practices that catalyze IT acceptance and adoption. In many cases, this is best accomplished by the removal of barriers to appropriate risk taking behaviour, by putting in place feedback mechanisms that evidence job relevance and by enhancing technology trust within the broader terrain of organizational trust.

8 LIMITATIONS

Several limitations in this study are recognized in terms of process or method as well as generalizability. First, this study reports findings at the $p < 0.10$ level consistent with the recommendations of Rosnow and Rosenthal (1989). However, some scholars disagree with the reporting of findings at levels other than the $p < 0.05$. As such, we present this as a potential limitation of our study and leave it up to individual readers to assess the implication of the two confidence levels.

A second, and less controversial, limitation is the low usable response rate principally attributable to the compromised mailing. Unfortunately the mailing list provided by the 4PL contained numerous address errors resulting in the return of 562 surveys because of incorrect addresses. While the lower than optimal response rate was partially caused by the unexpected errors in the mailing list, a higher overall response rate would have been preferable.

Third, this study included only the first-tier suppliers of the second largest U.S. automotive manufacturer. Thus, from a conservative research perspective, generalizability should be restricted to companies in this specific industry and supply chain tier. The inclusion of only first-tier suppliers could affect the study's external validity with regard to second- or third-tier CVN users within this supply chain context. That said, CVN has been implemented in other industries such as the television manufacturing business and the heavy equipment manufacturing business so studies could consider similarities and differences in technology performance issues in these industries.

Care should be exercised when extrapolating the results until the study is replicated across different populations. Cross-sectional studies such as this may not fully capture the complexity or periodicity of the adoption and usage processes since beliefs, attitudes, and decisions are dynamic. Therefore, the results of this study should be viewed as only preliminary evidence with respect to the varying criteria that influence technology performance.

9 FUTURE RESEARCH

Future research might examine the degree of risk an individual is willing to experience and the effect of this level on their trust assessments. Additionally, evaluating the individual's predisposition to trust may also impact the individual's willingness to use a technology. The trust an individual has in the technology will also be influenced by other external variables. Consideration should be given to identifying other variables likely to affect an individual's trust in the technology and overall technology adoption behaviour. In particular, additional research should be undertaken to discover the differences in domains between the individual response and the organizational response to technology acceptance and how they interact with one another.

Longitudinal studies could be used to explore how perceptions toward the technology and their supply chain partners change over time. This would enable the development of strategies to facilitate technology acceptance based on how and to what degree the individual's attitudes change within different HR system design contexts.

This study is rich with opportunities to follow a number of paths of investigation to better understand the effects of trust antecedents on post-adoption behaviour. Of particular note is the potential for the exploration of selected demographic variables. For example, the population of this study was disproportionably female (62.9%). Upon reflection, we suspect there is a likely misdistribution of gender in cases of large scale technology adoptions. More specifically, we suspect that there is a higher male participation in the adoption and early implementation phases followed by higher female participation during the mid-adoption and continuous adjustment phases. If this is indeed true, an investigation of gender could produce important insights into the path of technology adoption. And in a similar vein, our research also suggests that investigations of the relationship between age and adoption are a worthy investigatory option. Conventional wisdom suggests that favourable adoptions responses would decrease with age. However, this could easily prove to be erroneous, just like some many age related stereotypes that have been revealed to be fallacious upon rigorous investigation. Technology acceptance is affected by a diverse set of antecedents. Continued research to strengthen the understanding of these relationships is both proposed and warranted.

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